REMARKS

The present Amendment amends claims 21, 24, 27, 37, 43 and 51 and leaves claims 23, 26, 29-32, 34-36, 38, 39, 41, 42, 44-50 and 52-55 unchanged. Therefore, the present application has pending claims 21, 23, 24, 26, 27, 29-32, 34-39 and 41-55.

The Examiner's cooperation is respectfully requested to contact Applicants' Attorney by telephone to schedule a telephone interview so as to discuss the outstanding issues of the present application. Such interview is particularly necessary being that the claims recite features, and have been amended to clarify such features, that are not taught or suggested by any of the references of record whether taken individually or in combination with each other.

Claims 21, 23, 24, 26, 27, 29-32, 37-40, 46, 47, 52 and 53 stand rejected under 35 USC §103(a) as being unpatentable over Hashemi (U.S. Patent No. 5,337,414) in view of Nakamura (U.S. Patent No. 5,388,013); claims 34, 35, 41, 42, 48, 49, 54 and 55 stand rejected under 35 USC §103(a) as being unpatentable over Hashemi in view of Nakamura and further in view of Cheney (U.S. Patent No. 5,285,456); and claims 36 and 50 stand rejected under 35 USC §103(a) as being unpatentable over Hashemi in view of Nakamura and further in view of Dixon (U.S. Patent No. 4,637,024). These rejections are traversed for the following reasons. Applicants submit that the features of the present invention as now more clearly recited in the claims are not taught or suggested by Hashemi, Nakamura, Cheney or Dixon whether taken individually or in combination with each other as suggested by

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the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw these rejections.

Amendments were made to each of the independent claims to more clearly recite that according to the present invention the host adaptor, or the at least one adaptor, includes a format converter for converting data of a count-key-data (CKD) format, in a case where the host adaptor or the at least one adaptor receives the data of the CKD format from the host device, into data of a fixed block architecture (FBA) format suitable for storage in the storage devices and sending the converted data of the FBA format to the cache through buses.

Thus, the present invention provides a storage system in which each of the host adaptors, or the at least one adaptor, converts data sent from a host device into FBA data, stores the converted FBA data in a cache memory, and the writes the FBA data thus stored in the cache memory into a storage device. According to the present invention, each host adaptor or at least one adaptor converts data of a CKD format into data of a FBA format, in a case where the data of the CKD format is sent from the host device, and writes the data of the FBA format thus converted into the cache memory through a path or bus. These features of the present invention now more clearly recited in the claims are not taught or suggested by Hashemi, Nakamura, Cheney or Dixon whether taken individually or in combination with each other as suggested by the Examiner.

In the Office Action the Examiner alleges that Hashemi teaches a storage system including host adaptors 8c1 and 8c2, a plurality of storage devices 70a-d, a plurality of disk adaptors 8d1-8d2, a cache memory 24c1, 24c2, 24d1 and 24d2 and two buses 6a and 6b. However, the Examiner readily admits that:

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"Hashemi does not teach the further limitation of each of said host adaptors includes a format converter to convert data from CKD format to the FBA format and storing the FBA format data in the cache memory".

The Examiner attempts to supply this deficiency of Hashemi by combining Hashemi with Nakamura. In the Office Action, the Examiner alleges that Nakamura teaches that:

"a host adaptor (magnetic disk controller 5 in Fig. 1) includes a data storage format converter that is used to convert data of a count-key-data (CKD) format sent from the host device (the host computer 1 in Fig. 1) into a data of a fixed block architecture (FBA) format and sending the converted data of the FBA format to the cache memory (6 in Fig. 1)".

More specifically, Nakamura discloses in Fig. 2 thereof a technique that a channel path server 51 and a cache memory 6 are provided within the disk controller 5 and data of a CKD format sent from a host computer is stored in the cache memory 6 as it is and then data of the CKD format thus stored in the cache memory is converted into data of FBA format and then stored in the cache memory 6. The Examiner's attention is directed to col. 10, line 68 through col. 11, line 4, col. 11, lines 12-20 and col. 14, lines 15-20 of Nakamura. These passages of Nakamura clearly teach that a data path server 55 reads and writes data of the FBA format as it is between the cache memory 6 and the FBA disk 9.

Thus, according to the above described features, Nakamura requires that the cache memory 6 have both a storage region for storage of data of the CKD format before conversion and a storage region for storage of data of the FBA format after conversion. Therefore, the cache memory 6 as taught by Nakamura must be at least

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twice the size as necessary since data of both formats before and after conversion are stored therein. Further, in Nakamura, an additional unnecessary processing step is required, namely the storage of the CKD data into the cache memory and the retrieval of the CKD format data from the cache memory 6 when conversion is to be conducted. Such a large size cache memory and the additional processing step described above as taught by Nakamura are not necessary or required in the present invention as recited in the claims.

Further, according to the teachings of Nakamura since the conversion processing of data of the CKD format into data of the FBA format is required after the data of CKD format is stored in the store cache memory 6, it is also required to access the cache memory at times before and after performing the conversion. Thus, in the case of the technique taught by Nakamura there arises problems that the load of accessing the cache memory for conversion of data of the CKD format into data of the FBA format becomes extremely large, thereby reducing the bandwidth of processing and handling data between the host computer and the storage device.

The above described features of the present invention as recited in the claims differs substantially from that taught by Nakamura being that according to the present invention each host adaptor includes a format converter which converts data of the CKD format to data of the FBA format without having to store data of the CKD format into the cache memory prior to such conversion. The present invention as recited in the claims avoids the bandwidth problems associated with Nakamura. Further, the present invention as recited in the claims avoids the need for having a

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cache memory twice as size as necessary in order to accommodate both CKD format data and FBA format data as in Nakamura.

Still further, the present invention avoids the problem of Nakamura of occupying the time of the storage controller unnecessarily performing the conversion and extra storage steps.

Thus, as is quite clear from the above, both Hashemi and Nakamura fails to teach or suggest that each host adaptor includes a format converter for converting data of a count-key-data (CKD) format, in a case where the host adaptors receives the data of the CKD format from the host device, into data of fixed block architecture (FBA) format suitable for storage in the storage devices and sending the converted data of the FBA format to the cache through the path as recited in the claims.

Therefore, as is quite clear from the above, the features of the present invention as now more clearly recited in the claims are not taught or suggested by Hashemi or Nakamura whether taken individually or in combination with each other as suggested by the Examiner. Accordingly, reconsideration and withdrawal of the 35 USC §103(a) rejection of claims 21, 23, 24, 26, 27, 29-32, 37-40, 46, 47, 52 and 53 as being unpatentable over Hashemi in view of Nakamura is respectfully requested.

The above described deficiencies of both Hashemi and Nakamura are not supplied by Cheney or Dixon. Thus, combining the teachings of Hashemi and Nakamura with one or more of Cheney and Dixon still fails to teach or suggest the features of the present invention as now more clearly recited in the claims. Therefore, reconsideration and withdrawal of the above described rejection of claims 34, 35, 41, 42, 48, 49, 54 and 55 under 35 USC §103(a) as being unpatentable over

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Hashemi, Nakamura and Cheney, and the rejection of claims 36 and 50 under 35 USC §103(a) as being unpatentable over Hashemi in view of Nakamura and Dixon is respectfully requested.
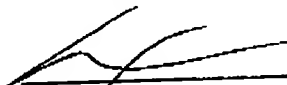
The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references utilized in the rejection of claims 21, 23, 24, 26, 27, 29-32, 34-39 and 41-55.

In view of the foregoing amendments and remarks, applicants submit that claims 21, 23, 24, 26, 27, 29-32, 34-39 and 41-55 are in condition for allowance. Accordingly, early allowance of claims 21, 23, 24, 26, 27, 29-32, 34-39 and 41-55 is respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER & MALUR, P.C., Deposit Account No. 50-1417 (500.33021CX5).

Respectfully submitted,

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